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Potential effects of horizontal gene exchange in the human gut

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Abstract

© 2017 Lerner, Matthias and Aminov. Many essential functions of the human body are dependent on the symbiotic microbiota, which is present at especially high numbers and diversity in the gut. This intricate host-microbe relationship is a result of the long-term coevolution between the two. While the inheritance of mutational changes in the host evolution is almost exclusively vertical, the main mechanism of bacterial evolution is horizontal gene excha nge. The gut conditions, with stable temperature, continuous food supply, constant physicochemical conditions, extremely high concentration of microbial cells and phages, and plenty of opportunities for conjugation on the surfaces of food particles and host tissues, represent one of the most favorable ecological niches for horizontal gene exchange. Thus, the gut microbial system genetically is very dynamic and capable of rapid response, at the genetic level, to selection, for example, by antibiotics. There are many other factors to which the microbiota may dynamically respond including lifestyle, therapy, diet, refined food, food additives, consumption of pre- and probiotics, and many others. The impact of the changing selective pressures on gut microbiota, however, is poorly understood. Presumably, the gut microbiome responds to these changes by genetic restructuring of gut populations, driven mainly via horizontal gene exchange. Thus, our main goal is to reveal the role played by horizontal gene exchange in the changing landscape of the gastrointestinal microbiome and potential effect of these changes on human health in general and autoimmune diseases in particular.

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Keywords

Biofilm, Dysbiome, Environment, Gut, Horizontal gene transfer, Intestine, Microbiome, Probiotics

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